

Murphy Water System, PWS#3370014 SOURCE WATER ASSESSMENT FINAL REPORT

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State of Idaho Department of Environmental Quality

Disclaimer: This publication has been developed as part of an informational service for the source water assessments of public water systems in Idaho and is based on the data available at the time and the professional judgement of the staff. Although reasonable efforts have been made to present accurate information, no guarantees, including expressed or implied warranties of any kind, are made with respect to this publication by the State of Idaho or any of its agencies, employees, or agents, who also assume no legal responsibility for the accuracy of presentations, comments, or other information in this publication. The assessment is subject to modification if new data is produced.

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This assessment is based on a land use inventory of the designated assessment area, sensitivity factors associated with the wells, and aquifer characteristics.

This report, *Source Water Assessment for Murphy Water System for Murphy, Idaho*, describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The Murphy Water System drinking water system consists of one well. The well has experienced detections of microbial contamination (total coliform) above maximum contaminant levels and inorganic chemical detections of fluoride, barium and nitrate, all of which have been below the maximum contaminant levels.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

For the Murphy Water System, source water protection activities should focus on environmental education with the businesses, residents and with parties engaged in activities that may affect water quality within the vicinity. Practices aimed at reducing the leaching of chemicals from agricultural land within the designated source water areas should be focused. Most of the designated areas are outside the direct jurisdiction of Murphy Water System. Partnerships with state and local agencies and industry groups should be established and are critical to success. Due to the time involved with the movement of ground water, source water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. Source water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission and local Soil Conservation District, and the Natural Resources Conservation Service. Activities such as recreation should be coordinated with the Bureau of Land Management, the Idaho Fish & Game Dept. and other related agencies.

A community with a fully developed source water protection program will incorporate many strategies. For assistance in developing protection strategies, please contact your regional Idaho Department of Environmental Quality office or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR MURPHY WATER SYSTEM

Section 1. Introduction - Basis for Assessment

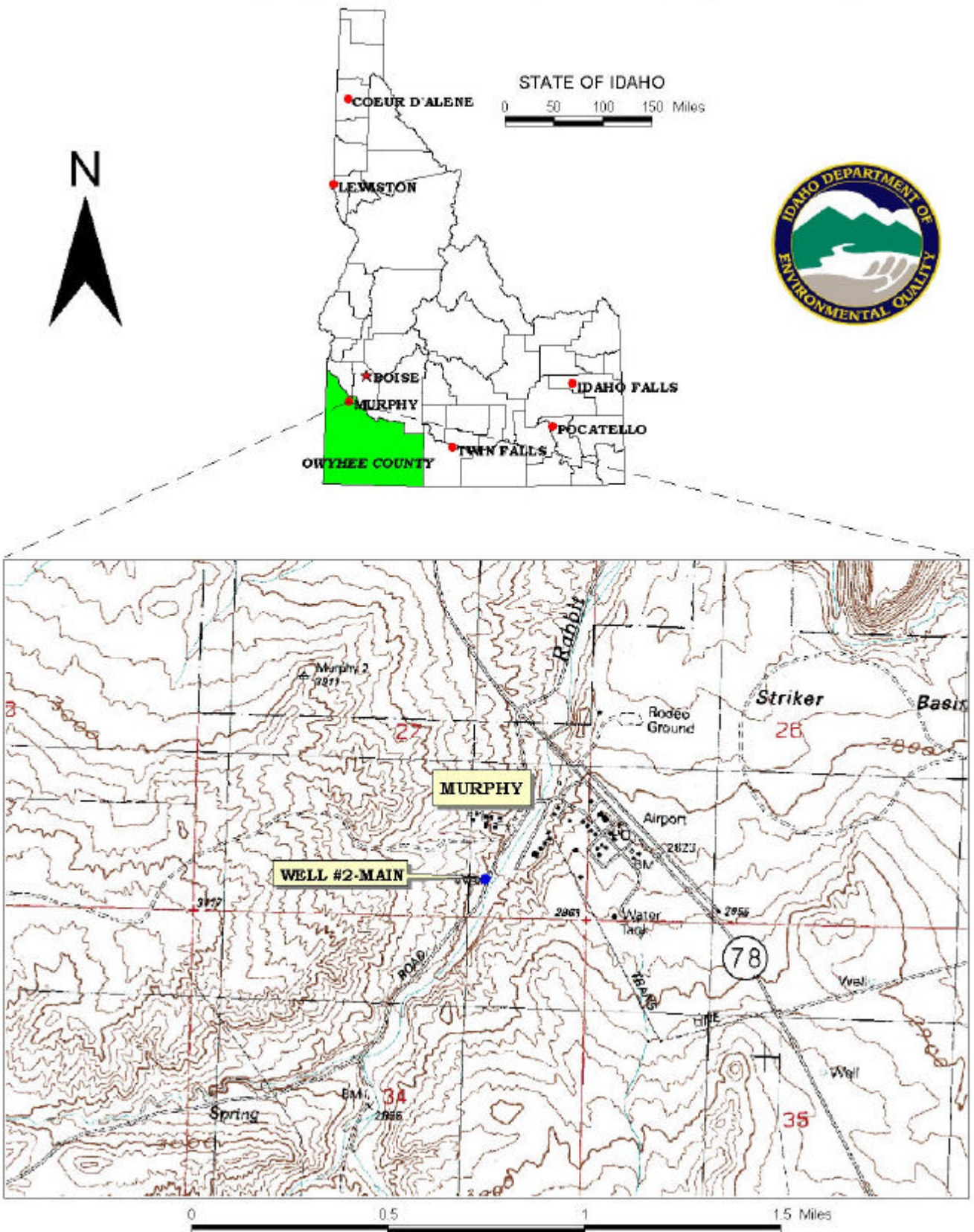
The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** A map showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are attached. The list of significant potential contaminant source categories and their rankings, used to develop this assessment, is also attached.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess the over 2,900 public drinking water sources in Idaho for their relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area, sensitivity factors associated with the wells, and aquifer characteristics. All assessments must be completed by May of 2003. The resources and time available to accomplish assessments are limited. Therefore, an in-depth, site-specific investigation to identify each significant potential source of contamination for every public water system is not possible. **This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The ultimate goal of this assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The Idaho Department of Environmental Quality (DEQ) recognizes that pollution prevention activities generally require less time and money to implement than treating a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a source water protection program should be determined by the local community based on its own needs and limitations. Wellhead or source water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

FIGURE 1. Geographic Location of the Murphy Water System



Section 2. Conducting the Assessment

General Description of the Source Water Quality

The Murphy Water System serves the City of Murphy, Idaho with a population of approximately 75 people. Murphy is located approximately 27 miles south of Nampa, Idaho along State Highway 78, south of the Snake River (Figure 1) in Owyhee County. The public drinking water system for the Murphy Water System consists of one well.

The primary water quality issue currently facing Murphy Water System is recent detections of total coliform bacteria. The detections of which may be related to the distribution system, not necessarily the source. Inorganic chemical compounds of barium, fluoride and nitrate have also been detected at levels below the maximum contaminant levels. Some of these inorganic detections may be naturally occurring.

Defining the Zones of Contribution - Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time of travel zones (zones indicating the number of years necessary for a particle of water to reach a well) for water in the aquifer. DEQ used a refined computer model approved by the EPA in determining the three-year (Zone 1B), six-year (Zone 2), and ten-year (Zone 3) time-of-travel (TOT) for water associated with the Homedale/Murphy aquifer system in the vicinity of the Murphy Water System. The computer model used site-specific data, assimilated by DEQ from a variety of sources including other local well logs.

The well for the Murphy Water System is completed to a depth of 171 feet below land surface, screened from 81-161 feet below a 20-foot thick blue clay sequence. The well is gravel packed from the ground surface to completion depth, and it is unknown where the pump is set in the well. The delineated source water assessment area for the Murphy Water System covers approximately 410 acres extending about 1 1/2 miles southwest of the well, up the Rabbit Creek drainage (Figure 2). The actual data used by DEQ in determining the source water assessment delineation area is available upon request.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and from available databases.

Land use in the immediate vicinity and outside of the immediate vicinity of Murphy Water System consists of rangeland. The homes in the area operate with individual septic systems.

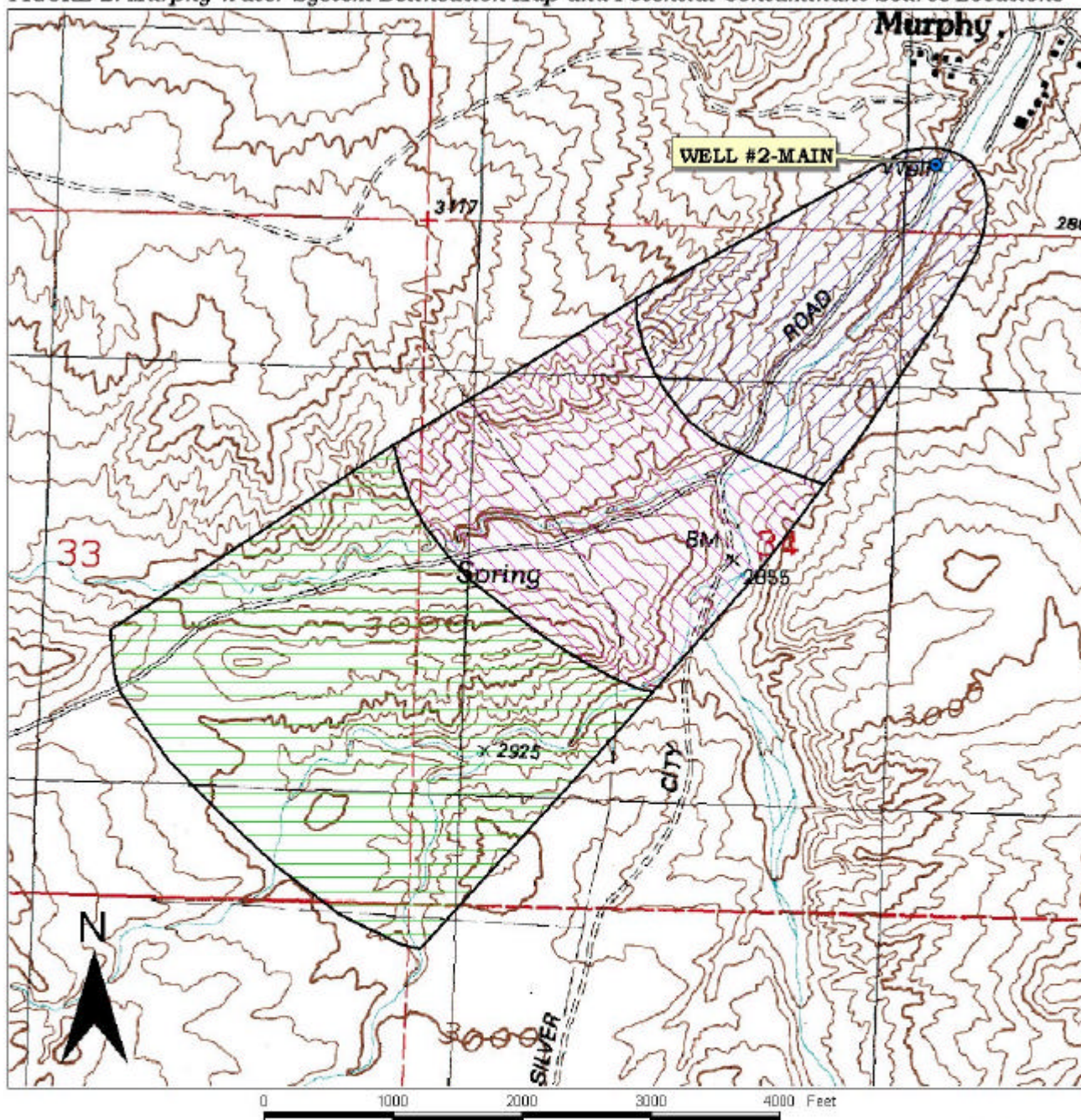
It is important to understand that a release may never occur from a potential source of contamination provided best management practices are used at the facility. Even though there are no potential sources identified at the current time, the public water system may be involved in future land use planning. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, such as educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A contaminant inventory of the study area was conducted during the spring of 2001. This involved identifying and documenting potential contaminant sources within the Murphy Water System Source Water Assessment Area through the use of computer databases and Geographic Information System maps developed by DEQ.

No potential contaminant sources were located within the delineated source water area for the well.

FIGURE 2. Murphy Water System Delineation Map and Potential Contaminant Source Locations



PWS# 3370014
WELL #2-MAIN

Section 3. Susceptibility Analyses

The susceptibility of the well to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

Hydrologic sensitivity is rated high for the Murphy Water System well. This score is based on soil drainage, vadose zone characteristics (unsaturated sequence above the water table), depth to first ground water and the thickness of an aquitard (impermeable layer above a confined aquifer). The aquitard for the Murphy Water System well is only 20 feet thick. The vadose zone for the Murphy Water System well consists of fractured basalt, below well-drained soils.

Well Construction

Well construction directly affects the ability of the wells to protect the aquifer from contaminants. Lower scores imply a system that can better protect the water. The Murphy Water System drinking water system consists of one well that extracts ground water for domestic and industrial uses. The well system construction score is moderate for the well.

Geologic materials encountered in the first 60 feet of the Murphy Water System well consist of fractured basalt. Below the basalt is 20 feet of blue clay lacustrine deposits that overlies a sand aquifer. Subsurface geologic and hydrogeologic information has also been interpolated by geologic cross section of surrounding wells.

The Idaho Department of Water Resources (IDWR) *Well Construction Standards Rules (1993)* require all public water systems (PWS's) to follow DEQ standards as well. IDAPA 58.01.08.550 requires that PWS's follow the *Recommended Standards for Water Works (1997)* during construction. Various aspects of the standards can be assessed from well logs. Current standards for casing thickness for 16-inch diameter casing are 0.375 inches, and 0.365 inches for 10-inch diameter casing. The casing thickness of the Murphy Water System well having 16-inch diameter is 0.312 inch and 0.250 inch for the 10-inch casing.

Table 1. Selected Construction Characteristics of the City of Murphy Well.

| Well # | Total Depth (ft.) | Screened Interval (ft. below ground surface) | Screen Below Blue Clay? | Surface Seal (ft.) | Gravel Pack Interval (ft.) |
|--------|-------------------|--|-------------------------|--------------------|----------------------------|
| 1 | 171 | 81-161 | Yes | 30* | Surface-161* |

*as indicated on well log

Potential Contaminant Source and Land Use

The well for the City of Murphy ranked in the low category for inorganic, volatile organic, synthetic organic, and microbial chemical classes in terms of potential contaminant sources and land use. Land use is predominantly rangeland.

Final Susceptibility Ranking

In terms of the total susceptibility score, it can be seen from Table 3 that the well ranked high in susceptibility for microbial contaminants, reflected by the detections of total coliform bacteria above maximum contaminant level. Inorganic compounds of fluoride, barium and nitrate have also been detected, but at levels below the maximum contaminant level. The hydrologic sensitivity for the well is high, based on soil drainage classification and a relatively thin aquitard.

Table 2. Summary of City of Murphy Susceptibility Evaluation

| Well # | Susceptibility Scores ¹ | | | | | | | | | |
|--------|------------------------------------|-----------------------|-----|-----|-----------|---------------------|------------------------------|-----|-----|-----------|
| | Hydrologic Sensitivity | Contaminant Inventory | | | | System Construction | Final Susceptibility Ranking | | | |
| | | IOC | VOC | SOC | Microbial | | IOC | VOC | SOC | Microbial |
| 1 | H | L | L | L | L | M | M | M | M | H* |

¹H = High Susceptibility, M = Moderate Susceptibility, Low Susceptibility

IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

²H* - Indicates source automatically scored as high susceptibility due to presence of either a VOC, SOC or microbial detected or an IOC above the maximum contaminant level in the tested drinking water

Susceptibility Summary

The City of Murphy drinking water system has experienced detections of microbial contaminants above the maximum contaminant levels. The system has also experienced detections of the inorganic compounds of barium, nitrate and fluoride; however the detections have been below maximum contaminant levels. Because the area surround the well and directly above the aquifer consists of well-drained soils, and fractured basalt above a relatively thin confining clay unit; those responsible for the water system may wish to consider this in future land use planning within the delineated area.

Section 4. Options for Source Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

An effective source water protection program is tailored to the particular local source water protection area. A community with a fully developed source water protection program will incorporate many strategies. For the City of Murphy, source water protection activities should focus on environmental education with the business operators, residents and with parties engaged in activities that may affect water quality within the vicinity. Most of the delineated areas are outside the direct jurisdiction of the City of Murphy. Partnerships with state and local agricultural agencies and industry groups should be established and are critical to success. Due to the time involved with the movement of ground water, wellhead protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. Source water protection activities can be coordinated with the Idaho State Department of Agriculture, the Idaho Department of Fish and Game, the U.S. Bureau of Land Management, and other federal, state and local agencies.

Assistance

Public water supplies and others may call the following IDEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the IDEQ office for preliminary review and comments.

Boise Regional IDEQ Office (208) 373-0550

State IDEQ Office (208) 373-0502

Website: <http://www2.state.id.us/deq>

Water suppliers serving fewer than 10,000 persons may contact John Bokor, Idaho Rural Water Association, at 1-800-962-3257 for assistance with wellhead protection strategies.

References Cited

Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, 1997. *“Recommended Standards for Water Works.”*

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Idaho Division of Environmental Quality, 1997. *Idaho Wellhead Protection Plan*.

Idaho State Department of Agriculture, 1998. Unpublished Data.

Idaho Department of Environmental Quality, 1997. *Design Standards for Public Drinking Water Systems*. IDAPA 58.01.08.550.01.

Idaho Department of Water Resources, 1993. *Administrative Rules of the Idaho Water Resource Board: Well Construction Standards Rules*. IDAPA 37.03.09.

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Ralston, D.R. and Chapman, S.L., 1969, *Ground Water Resource of Northern Owyhee County, Idaho*. Water Information Bulletin No. 14, Idaho Dept. of Reclamation.

U.S. Department of Agriculture (USDA) Soil Conservation Service, 1991. *Soil Survey of Elmore County Area, Parts of Elmore, Owyhee and Ada Counties*

Attachment A
City of Murphy
Susceptibility Analysis
Worksheet

The final scores for the susceptibility analysis were determined using the following formulas:

- 1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)
- 2) 2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.35)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

> 13 High Susceptibility

Ground Water Susceptibility Report

Public Water System Name :

MURPHY WATER SYSTEM
3370014

Well# : WELL #2-MAIN

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1. System Construction

SCORE

| | | |
|---|---------|------|
| Drill Date | 3/11/74 | |
| Driller Log Available | YES | |
| Sanitary Survey (if yes, indicate date of last survey) | YES | 1996 |
| Well meets IDWR construction standards | NO | 1 |
| Wellhead and surface seal maintained | YES | 0 |
| Casing and annular seal extend to low permeability unit | NO | 2 |
| Highest production 100 feet below static water level | NO | 1 |
| Well located outside the 100 year flood plain | YES | 0 |

Total System Construction Score 4

2. Hydrologic Sensitivity

| | | |
|---|-----|---|
| Soils are poorly to moderately drained | NO | 2 |
| Vadose zone composed of gravel, fractured rock or unknown | YES | 1 |
| Depth to first water > 300 feet | NO | 1 |
| Aquitard present with > 50 feet cumulative thickness | NO | 2 |

Total Hydrologic Score 6

3. Potential Contaminant / Land Use - ZONE 1A

| IOC Score | VOC Score | SOC Score | Microbial Score |
|-----------|-----------|-----------|-----------------|
|-----------|-----------|-----------|-----------------|

| | | | | | |
|---|-----------------------------|----|----|----|-----|
| Land Use Zone 1A | RANGELAND, WOODLAND, BASALT | 0 | 0 | 0 | 0 |
| Farm chemical use high | NO | 0 | 0 | 0 | |
| IOC, VOC, SOC, or Microbial sources in Zone 1A | YES | NO | NO | NO | YES |
| Total Potential Contaminant Source/Land Use Score - Zone 1A | | 0 | 0 | 0 | 0 |

Potential Contaminant / Land Use - ZONE 1B

| | | | | | |
|---|---------------------------------|---|---|---|---|
| Contaminant sources present (Number of Sources) | NO | 0 | 0 | 0 | 0 |
| (Score = # Sources X 2) 8 Points Maximum | | 0 | 0 | 0 | 0 |
| Sources of Class II or III leacheable contaminants or | NO | 0 | 0 | 0 | |
| 4 Points Maximum | | 0 | 0 | 0 | |
| Zone 1B contains or intercepts a Group 1 Area | NO | 0 | 0 | 0 | 0 |
| Land use Zone 1B | Less Than 25% Agricultural Land | 0 | 0 | 0 | 0 |

Total Potential Contaminant Source / Land Use Score - Zone 1B 0 0 0 0

Potential Contaminant / Land Use - ZONE II

| | | | | | |
|---|---------------------------------|---|---|---|--|
| Contaminant Sources Present | NO | 0 | 0 | 0 | |
| Sources of Class II or III leacheable contaminants or | NO | 0 | 0 | 0 | |
| Land Use Zone II | Less than 25% Agricultural Land | 0 | 0 | 0 | |

Potential Contaminant Source / Land Use Score - Zone II 0 0 0 0

Potential Contaminant / Land Use - ZONE III

| | | | | | |
|--|----|---|---|---|--|
| Contaminant Source Present | NO | 0 | 0 | 0 | |
| Sources of Class II or III leacheable contaminants or | NO | 0 | 0 | 0 | |
| Is there irrigated agricultural lands that occupy > 50% of | NO | 0 | 0 | 0 | |

Total Potential Contaminant Source / Land Use Score - Zone III 0 0 0 0

Cumulative Potential Contaminant / Land Use Score

0 0 0 0

4. Final Susceptibility Source Score

10 10 10 10

5. Final Well Ranking

Moderate Moderate Moderate High

POTENTIAL CONTAMINANT INVENTORY

LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as Superfund is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (IDEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by IDEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water